AAI/ Maricopa County Department of Environmental Services Seminar
Semiconductor Specific Permit Conditions
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Industry's perspective:

- Maricopa County Department of Environmental Services (MCESD) and the semiconductor industry in Maricopa County were both frustrated with the air permitting process for semiconductor facilities.
- In 1999, most of the semiconductor facilities in Maricopa County were in the process of preparing applications for new permits or were renewing existing permits because the permits were close to the expiration date.
- MCESD already had many applications in the air permit applications in the reviewing queue.
- Different semiconductor facilities negotiated and were issued different air permit conditions for similar or identical circumstances by MCESD.
- MCESD is not adequately staffed to issue timely permits if each and every permit applicant negotiate individual permit conditions with MCESD.

Some of the contentious issues regarding permit conditions:

(1) the need to conduct duplicate performance tests on identical or similar abatement equipment;
(2) the practice of demonstrating compliance of low inlet concentration exhaust by spiking the exhaust with acid gas (usually HCl);
(3) the need to have operations and maintenance plans for exhaust conditioners;
(4) the need to notify, log, and keep records on unregulated chemicals and for environmentally insignificant operations;
(5) MCESD, using internally developed guidance, required permit applicants to perform computer dispersion emissions modeling for unregulated chemicals and based on the results of the modeling, MCESD imposed permit conditions and prohibitions on operations using unregulated chemicals.

- It was these issues that provided the opportunity and incentive for representatives of the semiconductor industry and MCESD to initiate the negotiation process.

- Motorola assumed the role of coordinator or facilitator in the process by scheduling meetings with local semiconductor facilities and setting up meetings with them to make sure that all semiconductor facilities had an opportunity to participate as stakeholders. The first industry only meetings addressed individual as well as group concerns and resulted in a set of industry goals. The next meetings were agency/industry meetings, usually conducted at MCESD.

- At the initial industry/MCESD meeting, MCESD and the semiconductor industry representatives agreed that many of their goals and objectives were one and the same.
    - Protection of the environment
    - Timely issuance of permits
    - Streamlined permitting process

- Standard permit conditions
- Protection of confidential information
- Clear understanding of requirements
- Ability to refocus personnel resources on value added activities
- Elimination of the process of spiking exhaust
- Encourage accountability of pollution abatement equipment manufacturer's

- Out of the list of contentious issues regarding permit conditions the MCESD/industry group decided to select one issue and to it work through.

- The work group decided to develop an industry/agency consensus policy that addressed only one issue, and that is - under what circumstances can and does MCESD require a semiconductor facility to conduct a performance test on acid scrubbers.

- Because the first goal of the work group was to develop an optional method for demonstrating compliance with permit conditions, the work group decided to call itself the Optional Compliance Demonstration (OCD) Team.

OCD Team

MCESD	**Semiconductor**
Harry Chiu	AMTI
Carrol Dekle	Epitronics
Paul Gilman	Intel
Kathy Houed	Microchip
Rick Kelley	Motorola
Steve Peplau	On Semiconductor
	Sitix

- The first step toward accomplishing this goal, was to develop clear, unambiguous working definitions for like kind equipment, initial start-up, point of use abatement equipment, exhaust conditioners and non-detectable.

- If successful, the OCD project would move on to Phase II and Phase III, tackling other issues of mutual interest and concern.

Unique Characteristics of the Semiconductor Industry Exhaust

- Because the inlet concentration of regulated pollutants in semiconductor facilities is very low, and because air pollution abatement equipment efficiency drops off at low inlet concentration, EPA approved test methods could show that the facility did not meet the minimum required removal efficiency despite already low emissions well within permitted limits.

- In order for a facility to demonstrate compliance with required removal efficiencies, semiconductor facilities resorted to the practice of loading or "spiking" the exhaust with the pollutant to be measured (typically HCl gas). This practice was expensive, somewhat dangerous and test results did not reflect true operating conditions.

- Conducting the performance tests might require that process equipment be shut down, especially if the exhaust had to be spiked to demonstrate compliance with minimum removal efficiency.

- Semiconductor factories take long periods of time from the initial placement of equipment until the factory is running at full permitted capacity. However standard permit conditions require that performance tests be conducted within 60 days of initial equipment installation.

- Due to high cost of facility downtime, semiconductor facilities usually have backup abatement equipment that is identical to equipment already tested.

- A typical performance test for an acid scrubber, including engineering costs, might run between $10,000 and $50,000.

  Semiconductor specific definitions were developed for initial startup, regulated pollutant, non-detectable, like-kind equipment and functionally similar equipment, exhaust conditioner and Point of Use Abatement that provided flexibility for permitees while at the same time assured that permit conditions would provide as good as or better environmental outcomes.

- Using the new definitions, a specific question that the semiconductor industry and MCESD addressed was:

  "How can a facility with low inlet concentration of HCl gas demonstrate compliance without loading the exhaust with HCl gas?"

- Using the definitions in the OCD agreement, a semiconductor industry specific permit condition that allows the facility to demonstrate compliance with minimum removal efficiency requirements if test results or engineering calculations show that the outlet concentration is less than or equal to 1 ppmv was developed.

Soon to be added to MCESD's web page at:
http://www.maricopa.gov/envsvc/AIR/permits/tablea.asp
http://www.maricopa.gov/envsvc/AIR/permits/policies.asp

- Optional Compliance Demonstration Procedure, A Guideline for Semiconductor Industry, Part I, Acid/Base Emissions & Wet Scrubber Performance Test, May 4, 2001.
- Optional Compliance Demonstration Procedure, A Guideline for Semiconductor Industry, Part II, Procedure to Determine Requirement for Operation and Maintenance Plan Point of Use/Exhaust Conditioner Units, May 4, 2001.
- Semiconductor Industry Standard Permit Conditions

How did we do? What's next?

- All goals achieved
  - Protection of the environment
  - Timely issuance of permits
  - Streamlined permitting process

    - Standard permit conditions
    - Protection of confidential information
    - Clear understanding of requirements
    - Ability to refocus personnel resources on value added activities
    - Elimination of the process of spiking exhaust
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- Phase III will address performance test for VOC Abatement and bypass.

Conclusion:

- This is a good venue for other industries that are have similar permitting issues.
- Time is saved on both sides.
- Relationships are enhanced by the experience.